DISSERTATION ON

SECONDARY COMPLICATIONS FOLLOWING CLEFT PALATE REPAIR AND MANAGEMENT

M.Ch. PLASTIC SURGERY

(BRANCH III)

MADRAS MEDICAL COLLEGE, CHENNAI

TAMILNADU Dr. M.G.R. MEDICAL UNIVERSITY
CHENNAI

FEBRUARY 2010

BONAFIDE CERTIFICATE

This is to certify that this dissertation is a bonafide record of the work done **by Dr. M. Sundararaj,** post graduate student in M. Ch. Plastic surgery during the period between June 1995 to March 1997 in the Department of Plastic Surgery, Madras Medical College and Refresher Course during March 2009 to August 2009 in the Department of Plastic Surgery, Coimbatore Medical College.

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DECLARATION

I, Dr. M. Sundararaj, solemnly declare that the dissertation titled **"SECONDARY COMPLICATIONS FOLLOWING CLEFT PALATE REPAIR AND MANAGEMENT"** is a bonafide work done by me while doing Post Graduate Course in Plastic Surgery at Madras Medical College, Chennai during the academic year of June 1995 to March 1997 under the supervision and guidance of Prof. D. Kamalakar Rao, M.S., M.Ch., Head of the department, Plastic surgery, Madras Medical College, Chennai and during the refresher course done at Coimbatore Medical College from March 2009 to August 2009 under the supervision and guidance of Prof. S. Palanivelu., M.S., M.Ch., Head of the department, Plastic Surgery, Coimbatore Medical College.

Place: Coimbatore **Dr. M. Sundararaj**

Date : 27.09.2009

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I sincerely thank them for their guidance given to me in doing this dissertation work on " Secondary complications following cleft palate repair and management".

I am deeply indebted to all my Assistant professors, Department of Plastic surgery at Madras Medical college and Coimbatore Medical college for taking active interest in formulating my dissertation.

CONTENTS

INTRODUCTION

The clinical evaluation, classification and management of cleft lip and cleft palate requires the surgeon to rely heavily on a thorough knowledge of embryology, head & neck anatomy and physical findings.

The cleft lip and palatal defects not only gives functional and aesthetic problems to the patient but also gives psychic trauma to the parents as well as the patient.

Even though various techniques are available for repair of cleft lip and palate, secondary complications do occur in some cases.

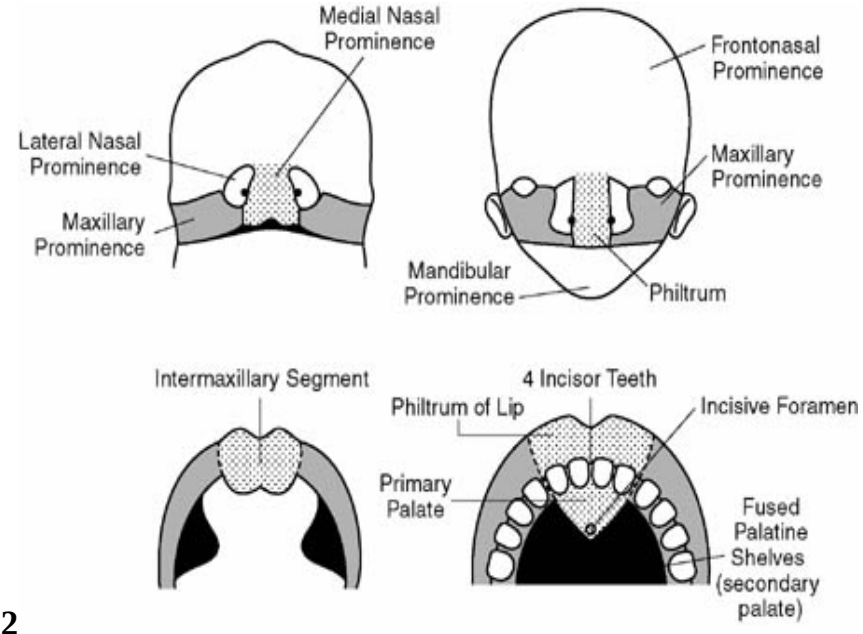
In this study the various secondary complications after cleft palate repair and their management were studied and discussed.

EMBRYOLOGY AND ANATOMY OF PALATE AND IN CLEFT PALATE

EMBRYOLOY

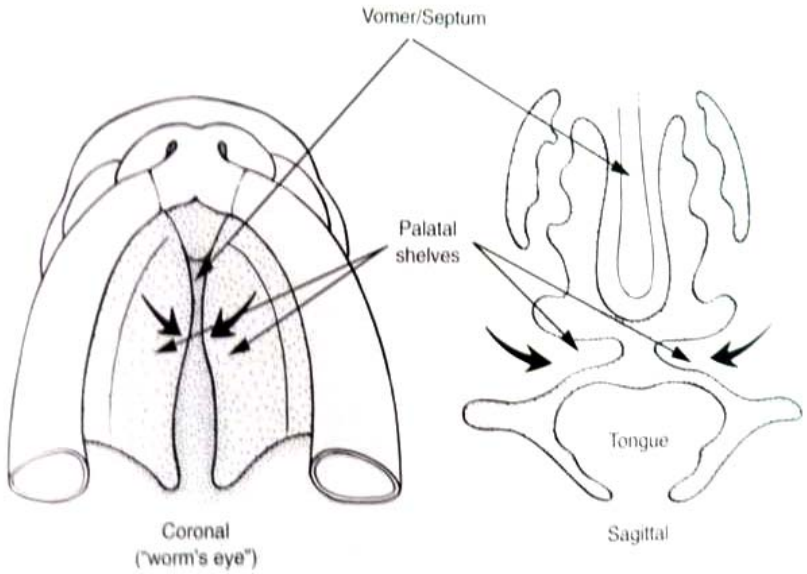
Development of face:

The Stomodeum is bounded by the mandibular arch which produces the floor of the mouth, lower jaw, and lower lip and two maxillary processes. Its cranial boundary is the forebrain capsule from which the frontonasal process grows. The frontonasal process is intended by two nasal pits which divide it into median and two lateral nasal processes.



The median process is characterized by a pair of converse globular processes. The lateral nasal processes encircle the eye and meet together along the line of the nasolacrimal duct.

The maxillary processes unite in the midline below the nostril to produce the whole of the upper lip and the maxilla. The frontonasal process produces the premaxilla which emerges on the facial skeleton is covered by medial extensions of maxilla. From each maxillary process a flange known as the palatal process grows medially across the dorsum of the tongue.



The two palatal processes and the nasal septum meet and unite from before backwards thus separating the nasal cavities from each other and from the mouth forming the nasal capsule.

Chondrification of the nasal capsule occurs and by the sixth week the nasal walls and hard palate are out lined by a thin layer of hyaline cartilage.Association of the cartilaginous nasal capsule begins almost at once spreading from several centers.

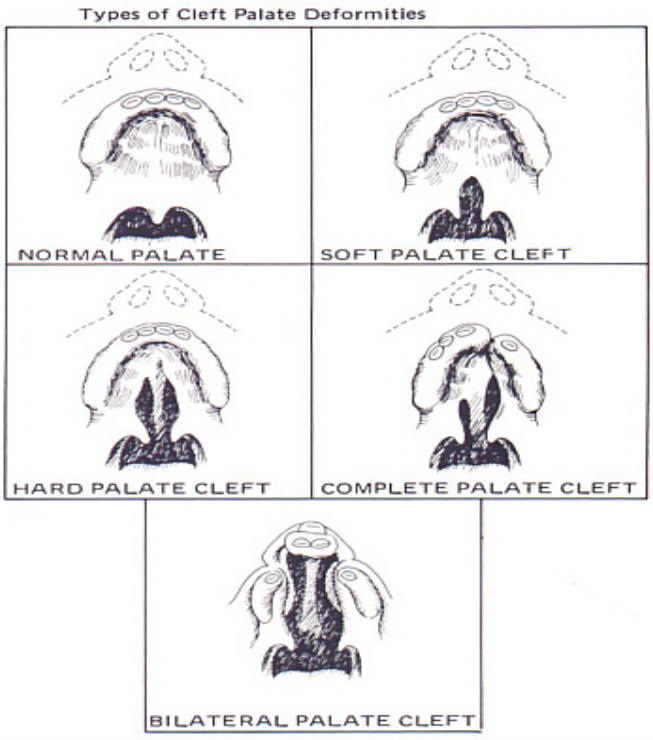
In the upper part of the nose the hyaline cartilage is replaced by bone, but in the lower part of the septum there is deposition of membranous bone on each surface of the hyaline cartilage. The cartilage thus sandwitched between two layers of membranous bone is not absorbed until some time after birth.

The nerve supply of all these structures, inside and outside is derived from the fifth cranial nerve. The frontonasal process and its derivatives are supplied by the maxillary division of the fifth nerve and the lower jaw by the mandibular division of the fifth nerve.

Defects of development

The commonest abnormality is cleft lip and palate which may or may not coexist. Cleft lip is usually lateral and the cleft runs down from the nostril. The median part of the lip is derived in these cases from the opposite maxillary process or perhaps from the frontonasal process, which later normally does not produce any part of the upper lip. Cleft lip may be bilateral in which case the central part of the lip between the two clefts is obviously derived abnormally from the frontonasal process.

Cleft Palate



Cleft Palate may be partial or complete. The two palatal processes unite with each other and with the nasal septum from before backwards. Arrest of union thus results in a posterior defect that varies from the mildest form of bifid uvula to gum margin.

In the latter case the cleft almost always runs between premaxilla and maxilla and involves the jaw between the lateral incisor and canine teeth. Irregular formation of incisor and canine teeth however often accompany these defects of palatal development. Very rarely a midline cleft may separate the two halves of the premaxilla.

According to stark: The primitive palate consists of prolabium, premaxilla, and cartilaginous septum developing as one unit. If the mesodermal penetration is not adequate, then the epithelial wall ruptures forming clefts in which side it is deficient. Three mesodermal masses within the epithelial wall constitutes the primary palate.

The palate proper which developed behind the nasopalatine foramen is termed as secondary palate, occurs between 7th - 12th week of intra uterine life.

ANATOMY

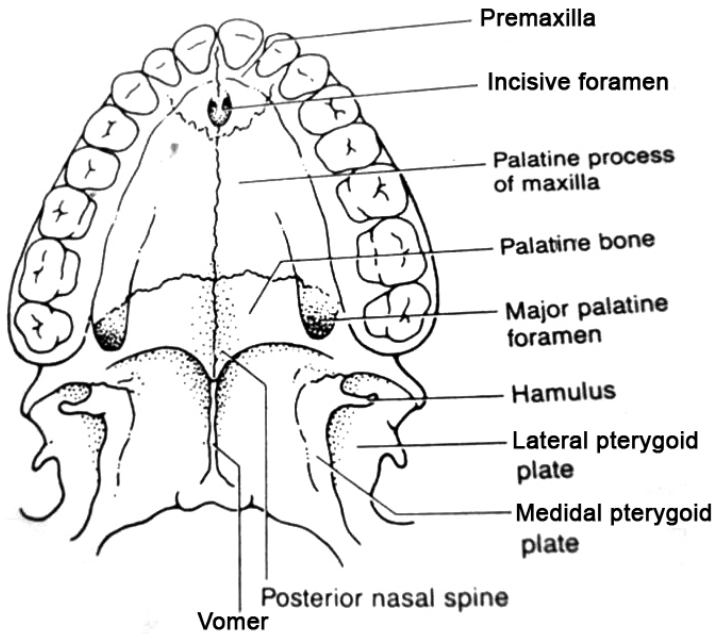
Hard palate forms a partition between the nasal and oral cavities. Its anterior two thirds are formed by the palatine processes of the maxillae and its posterior one third by the horizontal plates of palatine bones. The posterior margin gives attachment to the soft palate which separates the nasopharynx from oropharynx.

MUSCLES OF PALATE

TENSOR VELI PALATINI

The tensor veli palatini is a flat muscle arising from the scaphoid fossa at the base of the medial pterygoid plate from the spina angularis of the sphenoid and from the anterolateral aspect of the cartilage of the eustachian tube.

It runs inferiorly and narrows down towards hamulus, where some of its bundles are attached. However most of the bundles pass in to a tendon that turns at right angle around the hamulus and widens like a fan towards the centre of the palate. It terminates either on the oral side of the aponeurosis which occupies the whole anterior third of the velum or directly in to it.



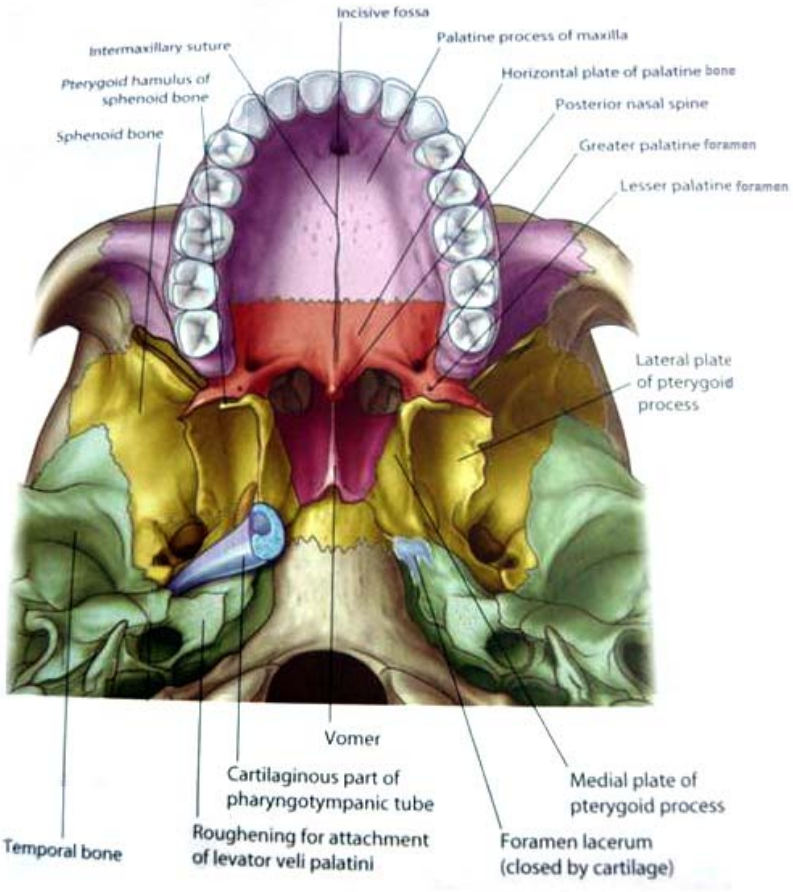
The tensor veli palatini and tensor tymphani share a common innervation ie mandibular division of trigeminal nerve and the latter muscle has fibers originate from the Tensor veli palatini.

Action

Primarily to dilate eustachian tube. Active during swallowing, blowing, sucking and during inspiration.

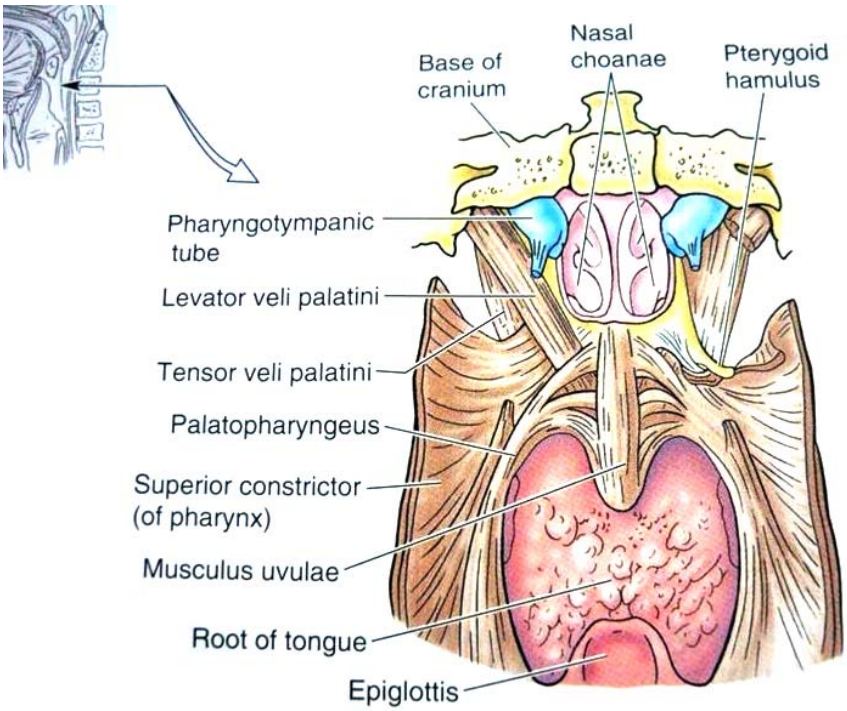
In cleft palate

The tensor veli palatini muscle is thinner and is attached to the posterior nasal spine or runs laterally to the posterior edge of the palatine bone or attached to cleft edge of soft palate. In cleft palate the palatine aponeurosis is rudimentary.



LEVATOR VELI PALATINI

This is a cylindrical muscle, the posterior bundles of which arise from the undersurface of the apex of the petrous part of temporal bone and anteromedially from the edge of the canal for the passage of the internal carotid artery. The anterior bundles arise from the base of cartilaginous portion of the eustachian tube.



Action

Elevates and shifts the soft palate backwards and dilates the eustachian tube.

In cleft palate

The levator muscles are hypoplastic. In most cases the posterior bundles pass between the palatopharyngeus to the base of the uvula and join them. The medial muscle bundles radiate like a fan in to the margin of the cleft. The anterior bundles are attached by triangular tendinous portion to the posterior nasal spine and laterally to the posterior edge of the hard palate while the lateral distinct part of these tendinous bundles merge with the tensor tendon

PALATOPHARYNGEUS

This muscle is divided into palatine part, pterygopharyngeal part and the salphingopharyngeal part.

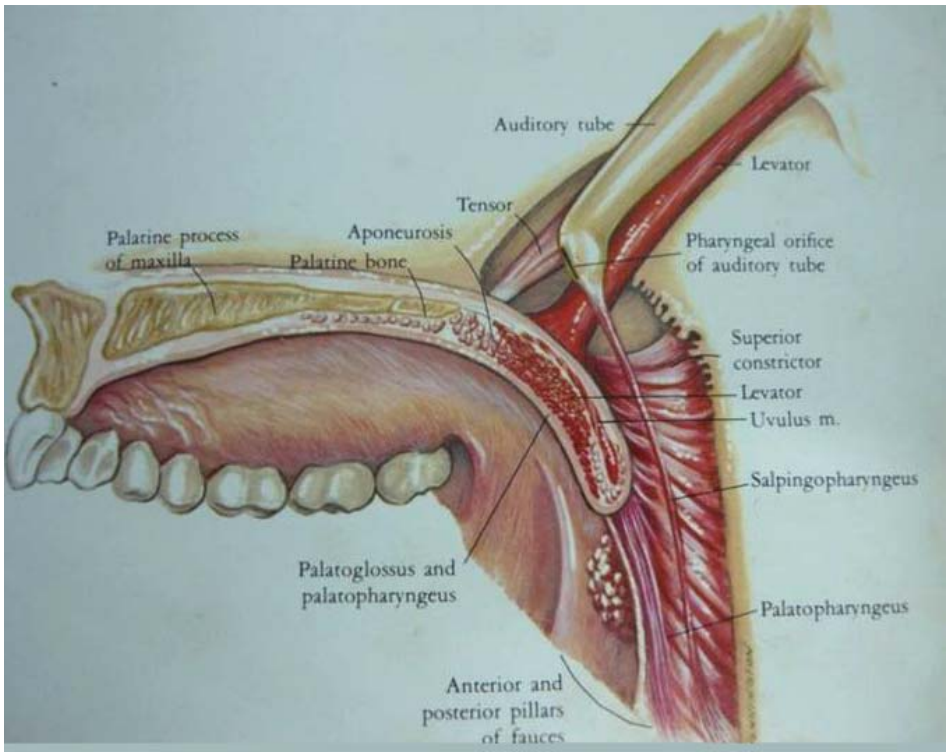
Palatine part arises from the thyroid cartilage and the adjacent part of the pharyngeal wall through the palatopharyngeal arch to its fan shaped insertion in the raphe.

Pterygopharyngeal part arises from the posterior and lateral aspects of the pharynx and inserts on the hamulus and the palatine aponeurosis intermingling with the pterygopharyngeal part of the superior constrictor.

The salphingopharyngeal part is the weakest portion and become attached to the inferior edge of the cartilage of the eustachian tube.

Action

Narrows the pharyngonasal isthmus by bringing the palatopharyngeal arches together. The soft palate is drawn posteroinferiorly as the palatopharyngeal arches stretch and adduct. At the same time the thyroid portion lifts the larynx and pharynx mainly during deglutition. The tubal portion facilitates dilatation of the eustachian tube by stabilizing its cartilage.



In Cleft Palate

The fibrous transformation of palatopharyngeus is less significant in comparison with tensor and levator. Its palatine insertion differed from the normal. Even though the smaller part of its fibres ended in the cleft margin, most of its bundles pass forward along this margin and gets inserted on the posterior edge of the hard palate and on the posterior nasal spine.

PALATOGLOSSUS

It is a slender muscle arising from the transverse bundles of the tongue. It passes up into the palatoglossus arch and gets inserted in a fan shaped manner into the muscles of the soft palate.

Action

Together with its opposite muscle it forms the anterior pretonsillar sphincter which narrows the Pharyngo oral isthmus. It is antagonistic to the levator. The palatoglossus lifts the tongue and propels food.

In cleft palate

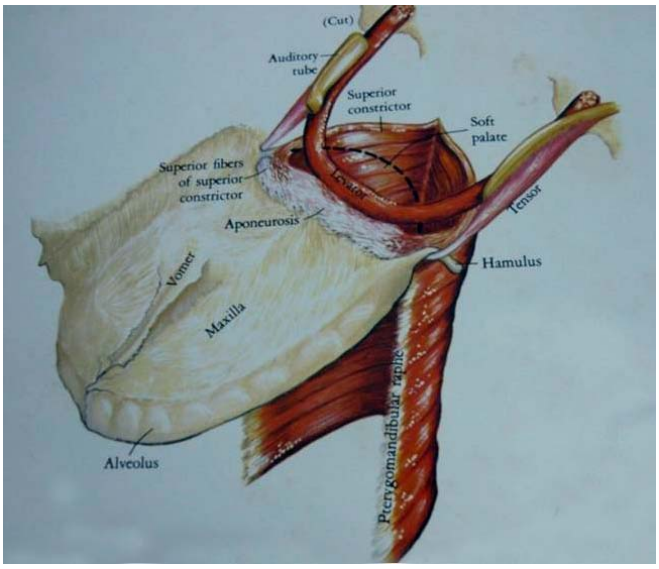
The palatoglossus passes in a posteroanterior direction in the cleft margin to the posterior edge of the hard palate, where it gets broadened and flattened as it reaches its insertion. Its palatal attachment extends in many cases beyond the posterior edge of the hard palate and become inserted more anteriorly.

UVULA

The uvular muscles are a cylindrical pair arising from the palatine aponeurosis and from the posterior nasal spine. They pass nasalwards from the other palatine muscles on either side of the medial sagittal plane to the top of the uvula where they end. They lift and bend uvula backwards and shortens it and the entire soft palate longitudinally.

In Cleft Palate

The muscles pass in the cleft margin and their bundles intermingle with those of the palatopharyngeus and the levator. The isolation of its fibres is very difficult.

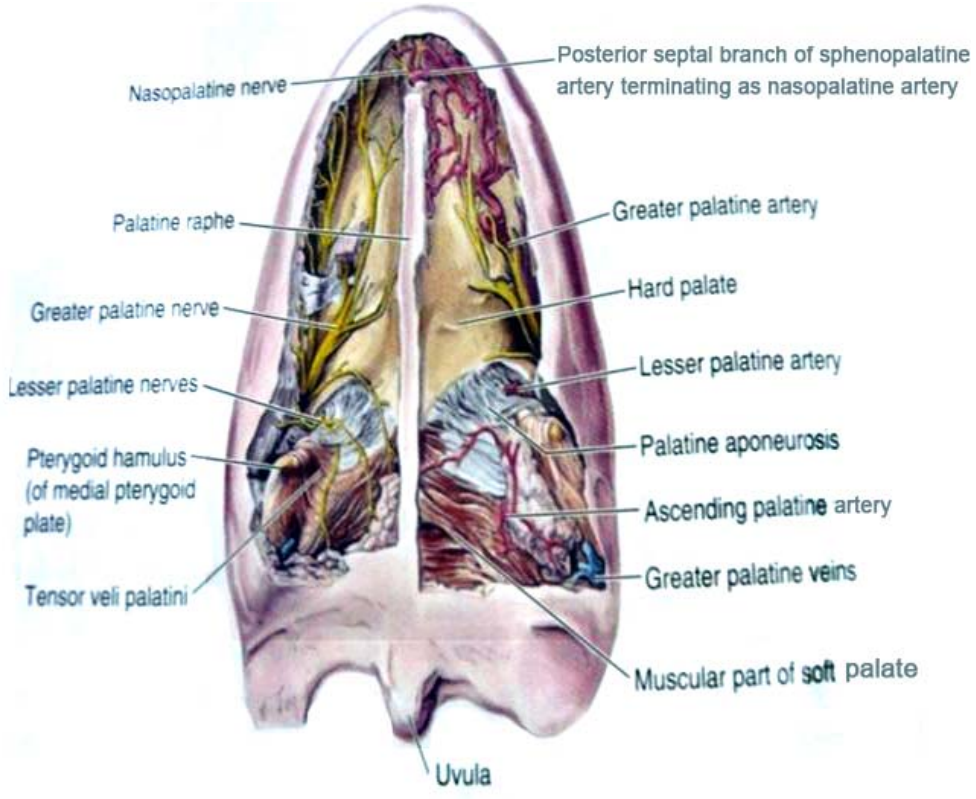


SUPERIOR PHARYNGEAL CONSTRICTOR MUSCLE

This is quadrangular muscle surrounding the upper third of the pharyngeal wall from behind and laterally. It is the deepest of the pharyngeal constrictors. The superior Pharyngeal Constrictor muscle originates from the pterrygoid hamulus, the lateral pterygoid plate , the pterygomaxillary ligament , the mandible and the floor of the mouth, and inserts in the posterior pharyngeal raphe. Passavant's ridge is formed by the upper fibres of the superior constrictor muscle.

BLOOD SUPPLY OF PALATE

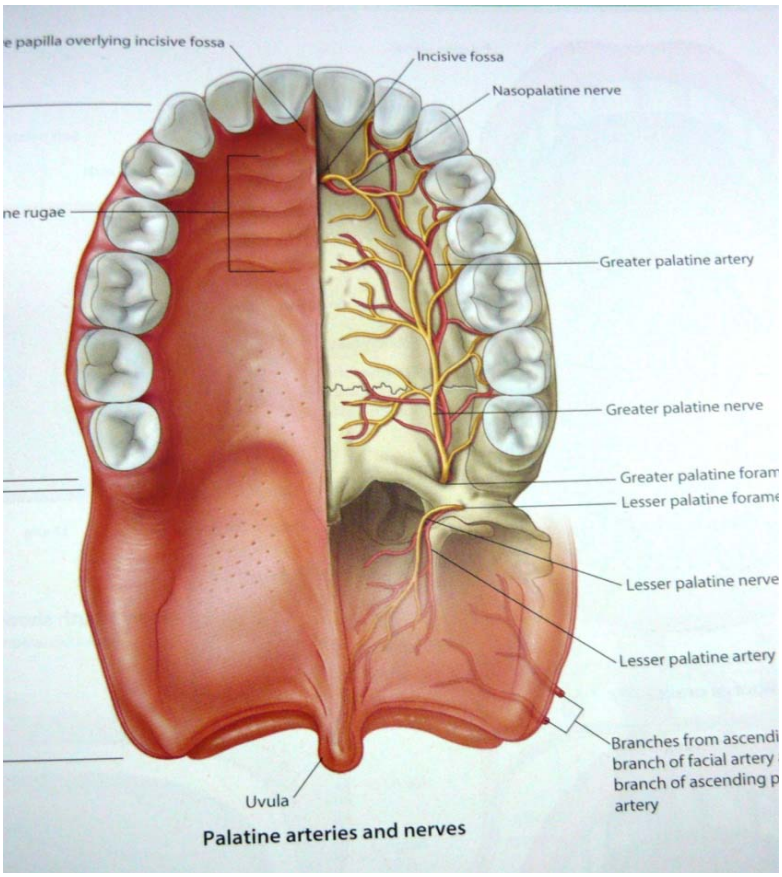
The descending palatine artery a branch of the maxillary artery divides in to greater and lesser palantine arteries. The greater palatine artery is the predominant blood supply to the hard palate. It enters the oral side of the palate through the grater palatine foramen. The lesser palatine artery turns posteriorly to supply the side of the anterior half of the velum.



The bones of the hard palate and nerves and vessels

The posterior septal branches of the nasopalatine artery which is a branch of maxillary artery supplies the nasal side of the palate. The posterior alveolar artery arises from maxillary artery supplies the

maxillary dentition.. There is vast network between these arteries. The ascending palatine artery which is a branch of facial artery supplies the soft palate and its musculature.



Palatine arteries and nerves

NERVE SUPPLY

The tensor veli palatini is innervated by mandibular branch of trigeminal nerve. Nerve fibres from the pharyngeal plexus innervate the muscles involved in the movement of velum.. The muscular uvula receives innervation from the glassopharyngeal nerve through lessor palatine nerve. Sensory innervation to the alveolus and hard and soft

palates is derived from infraorbital branch of the maxillary division of trigeminal nerve.

Branches from the infraorbital nerve contribute to the formation of pterygopalatine ganglion from which the greater and lesser palatine nerves arise to receive sensation from the posterior portion of hard palate and oral surface of soft palate respectively. The nasopalatine branch of the infraorbital nerve passes through incisive foramen to reach anterior hard palate.

OVERALL MUSCLE ARRANGEMENT IN CLEFT PALATE

In cleft palate the muscles extending towards the central line of the soft palate cannot attach themselves to a fixed point in the raphe of the soft palate. So they insert at various substitute points, which prevent the muscles from becoming fully functional, so that their development is retarded.

The palatoglossus and palatopharyngeus muscles through their palatine portions find attachment at a very acute angle. Thus most of their muscle bundles easily bypass the margin of the cleft palate and find a reliable substitution for insertion in line with their long axis on the

posterior edge of the hard palate. The fact is that in all forms of clefts the cleft muscle becomes thicker in the postnatal life because of the increasing demands made upon the substitute muscular insertion.

Palatoglossus in cleft palate is hypoplastic. This with palatopharyngeus are alike in that each of these muscles form a muscular sling with thinner compact central part with fan shaped edges, which radiate into mobile organs.

The Levator as it advances to its insertion point in the midline of the palate almost at a right angle in a less favorable situation. It approaches the margin of the cleft, but fails to secure a sufficiently firm print of insertion with the tensor anteriorly and uvulas and platopharyngeons posteriorly.

This mutual conjugation of all three main muscles of the soft palate is a typical cleft palate arrangement. Because of the absence of usual muscular insertions the levator cannot function adequately and undergo atrophy, as also the tensor muscle.

Because of a typical arrangement of the muscles; certain bony changes usually seen in clefts like large hamulus.

The pterygopharyngeal part of the palatopharyngeus and the superior constrictors compensate for the loss of function of the soft palate on the pharyngeal side. Elevation of the soft palate plays the main part in velopharyngeal closure.

The degree of hypolasia of the levator is directly proportional to the severity of the cleft palate and by pulling the soft palate supra laterally causing a further enduring of the cleft. Detaching the cleft insertions and joining the muscles of both halves of the soft palate in the midline was therefore be considered the basic principle of cleft palate surgery.

ETIOLOGY OF CLEFT PALATE

1. Genetic factor.
2. Old parental age.
3. Racial Influences- more in oriental and Caucasians.
4. Patients with multiple anomalies like treacher collins syndrome or stickler syndrome.
5. Environmental factors in utero -Hypoxia, rubella and diabetes.
6. Anaemia, riboflavin, folic, pantothenic and nicotinic acid deficiencies.
7. Ionizing radiation, hormones, cortisone and alkylating agents - in utero.

CLASSIFICATIONS BY DAVIS AND RITCHIE

Group I - Prealveolar clefts, unilateral, median or bilateral.

Group II - Postalveolar clefts involving the soft palate only, the soft and hard palates or a submucous cleft.

Group III - Alveolar clefts, unilateral, bilateral or median.

VEAU'S CLASSIFICATION

Group I - Cleft of the soft palate only

Group II - Cleft of the hard and soft palate tending no further than the incisive foramen thus involving the secondary palate alone.

Group III - Complete unilateral cleft, extending from the Uvula to the incisive foramen in the midline, then deviating to one side and usually extending through the alveolus at the position of the future lateral incisor tooth.

Group IV - Complete bilateral cleft, resembling group III with two clefts extending forward from the incisive foramen through the alveolus, the small anterior element of the palate commonly referred to as the premaxilla, remains suspended from the nasal septum.

NAGPUR BALAKRISHNAN'S CLASSIFICATION

Group I - cleft lip alone

Group I a - cleft lip with cleft alveolus

Group II - cleft palate

Group III - cleft lip and palate

Submucous cleft

HARKINS CLASSIFICATION BASED ON THE EMBYONIC PRINCIPLES USED BY KERNAHAN AND STARK

1. Cleft of Primary Palate

A. Cleft lip

1. Unilateral : right, left
   a) extent : onethird, twothirds, complete
2. Bilateral : right, Left
   a) extent : One third, two thirds, complete.

3. Median

a) extent : One third, two thirds, complete

4. Prolabium : Small, Medium, large

5. Congenital scar : right, left median

a) extent : One third, two thirds, complete

B. Cleft of Alveolus

1. Unilateral : right , left

a) extent : One third, two thirds, complete

2. Bilateral : right, Left

a) extent : One third, two thirds, complete

3. Median

a) extent : one third, two thirds, complete

4. Submucous : right, left, median

5. Absent incisor tooth

2. Cleft of Palate

A. Soft Palate

1. Postero anterior : one third, two thirds, complete.
2. Width. maximum (mm)
3. Palatal shortness none, slight, moderate, marked.
4. Submucons cleft
   a) extent : one third, two thirds, complete.

B. Hard Palate

1.	Postero anterior	:	one third, two thirds, complete.
2.	Width. maximum (mm)		
3.	vomer attachment	:	right, left, absent.
4.	Submucous cleft a) extent	:	one third, two thirds, complete.

KERNAHAN AND STARK CLASSIFICATION

Clefts of primary palate (lip and premaxilla) only

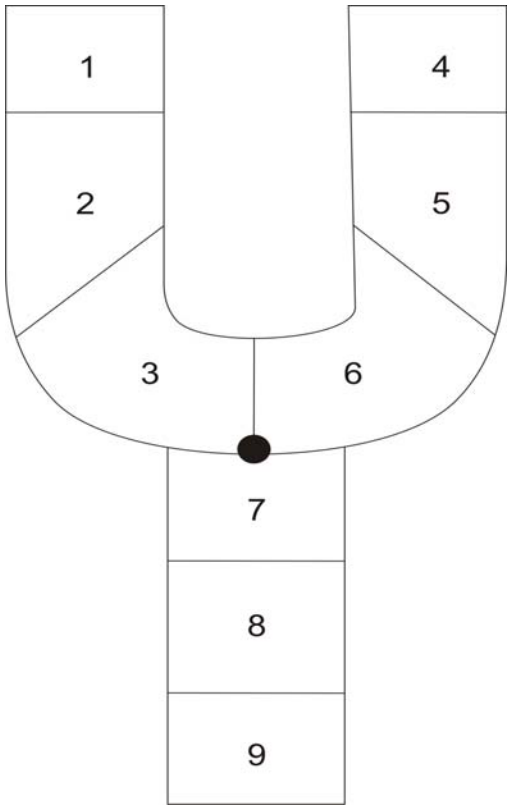
Unilateral (right or left)	:	Total, Subtotal.
Median	:	Total (premaxilla absent). Subtotal (premaxilla rudimentary).
Bilateral	:	Total, Subtotal.

Clefts of the secondary palate only : Total, Subtotal, Submucous.

Clefts of the primary and secondary palates

Unilateral (right or left)	:	Total, Subtotal
Median	:	Total, Subtotal
Bilateral	:	Total, Subtotal

THE STRIPED Y CLASSIFICATION OF KERNAHAN



Circle represents incisive foramen

1 and 4 represents the lip

2 and 5 represents the alveolus

3 and 6 represents the primary palate

7, 8, 9 represents the hard and soft portions of the secondary palate.

AIM OF THE STUDY

The main objectives of this study are

1. To evaluate the secondary complications following cleft palate repair and their management.
2. To discuss about the various types of secondary complications and methods of treatment.
3. To study about the post operative recurrences.
4. To study about the results.

MATERIALS AND METHODS

Materials

Eighteen cases with Secondary complications following cleft palate repair were seen during the period between June 1995 to March 1997 & March 2009 to August 2009 in the Department of Plastic surgery, Madras & Coimbatore Medical College respectively.

Methods

The methods include obtaining history regarding the nature of primary illness, nature of primary surgery and its secondary complications. Those patients with secondary complications were evaluated according to their Age, sex, time of primary surgery, immediate & late post operative history, interval between the primary surgery and its complications.

Patients with complications were operated according to the nature of their secondary complications. Regular immediate & late post operative follow up were made and the results were enumerated.

OBSERVATION AND STUDY RESULTS

In our study 18 cases of secondary complications following cleft palate repair were seen.

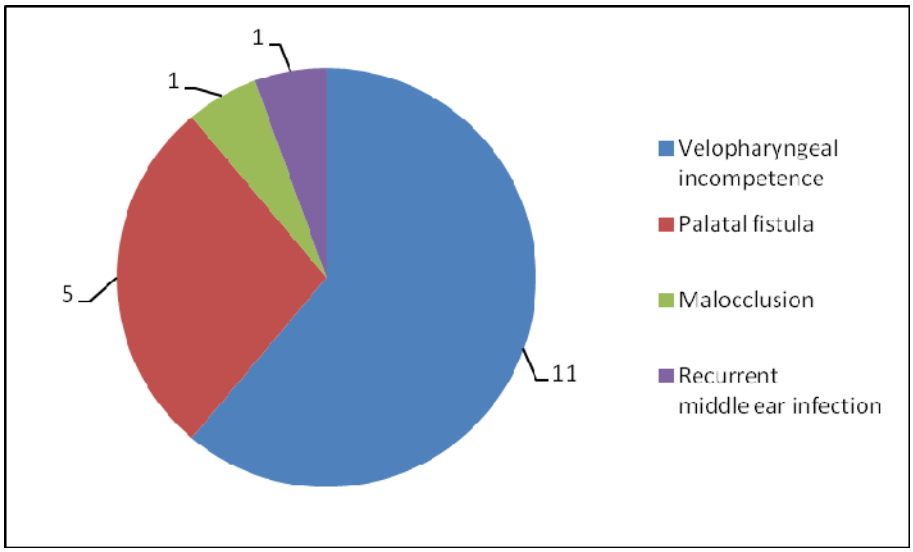
Incidence of Velopharyngeal incompetence	Incidence of palatal fistula	Other complications (malocclusion & recurrent middle ear infection)
11	5	1+1

11 cases presented with Velopharyngeal incompetence.

5 cases with palatal fistula

1 case with malocclusion and

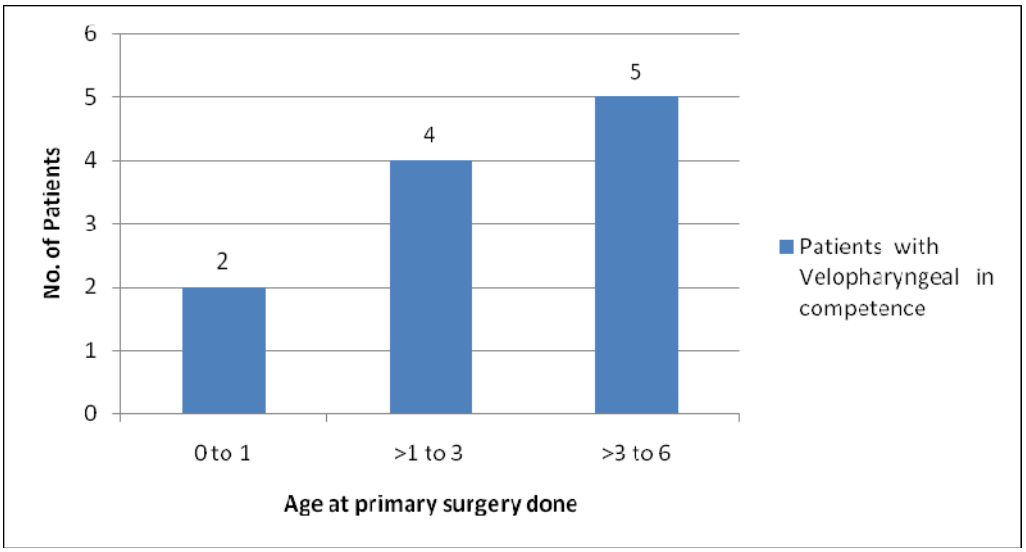
1 case with recurrent middle ear infection.



Incidence of Secondary Complications

The Age at which primary surgery done and incidence of Velo pharyngeal incompetence.

Age at Primary surgery done	Patients with Velopharyngeal incompetence
0 to 1	2
>1 to 3	4
>3 to 6	5



Incidence of Velopharyngeal incompetence in relation to Age at which primary surgery done

The Age at which primary surgery done and incidence of Palatal fistula

Age at Primary surgery done	Patients with Palatal fistula
0 to 1	0
>1 to 3	5
>3to 6	0

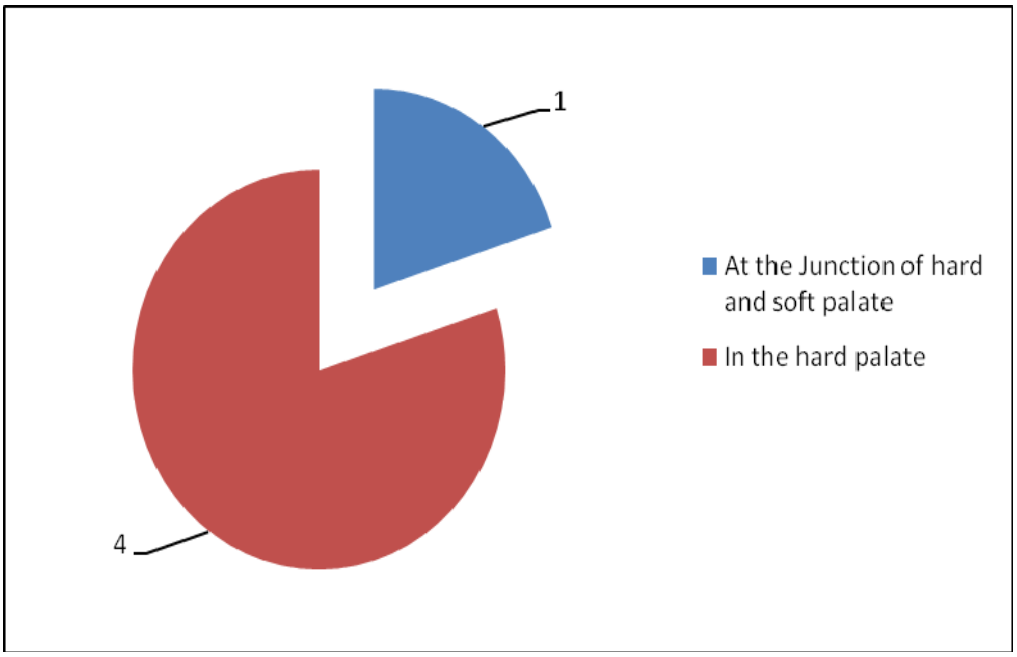
Size of Fistula

Size of Fistula	No. of Patients
1.25 cm diameter	1
0.75 to 1 cm	4

Type of cleft prior to primary surgery and incidence of Velopharyngeal in competence and Palatal fistula

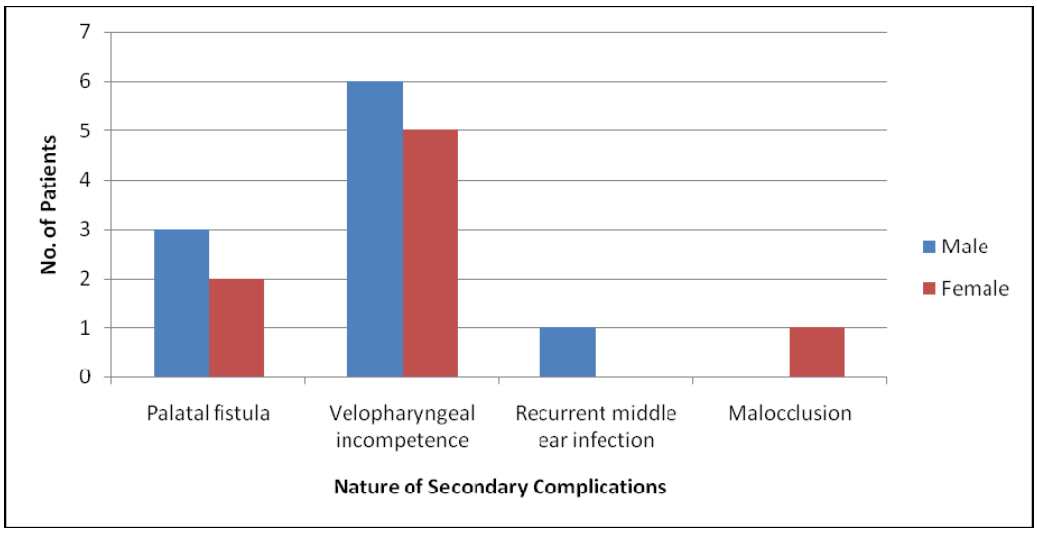
Type of cleft - prior to primary surgery	Velopharyngeal incompetence	Palatal fistula
Unilateral	11	4
Bilateral	0	1

Location of Fistula	No. of Patients
At the Junction of hard and soft palate	1
In the hard palate	4



The incidence of male Vs females with secondary complications following cleft palate repair.

Nature of secondary complications	Male	Female
Palatal fistula	3	2
Velopharyngeal incompetence	6	5
Recurrent middle ear infection	1	0
Malocclusion	0	1



All patients with Velopharyngeal incompetence were operated with superiorly based pharyngeal flaps.

Out of 5 patients with palatal fistula 3 cases were operated with hinge flap for nasal layer and local transposition of palatal mucosa for oral layer and 2 cases with Tongue flap. 1 case had fistula in the junction of hard and soft palate and 4 cases had fistula in the hard palate.

One patient had fistula measuring 1.25cm in diameter in the anterior hard palate and the rest measured 0.75 to 1cm in diameter.

Patient with recurrent middle ear infection was treated conservatively and one patient with malocclusion was treated with palatal expander.

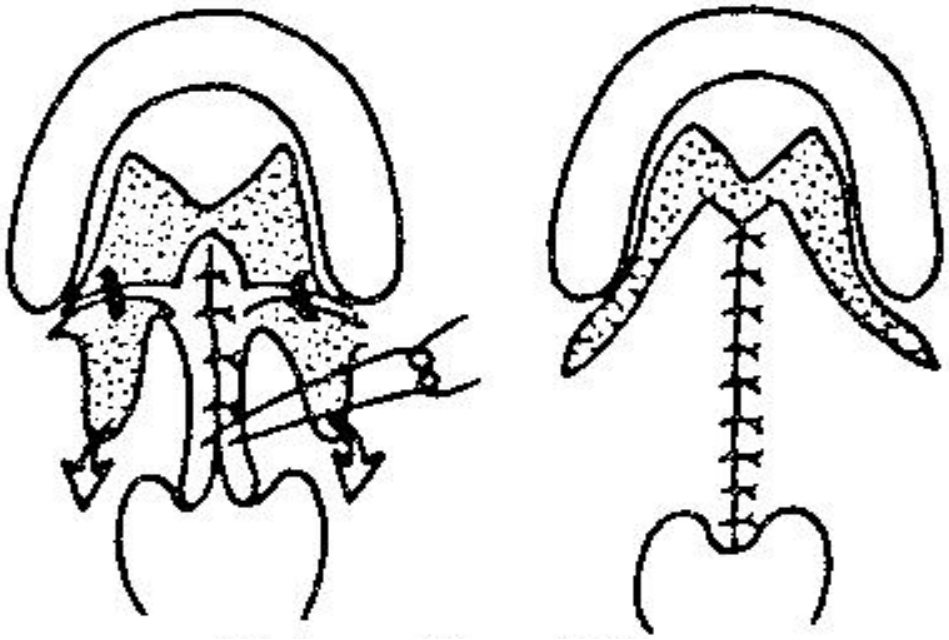
DISCUSSION

The goal of cleft palate surgery is to close the palate with a technique and timing that produce optimal speech and minimize facial growth disturbances.

The Operative procedures for cleft palate are

1. Veau -Wardill - Kilner - push back palatoplasty

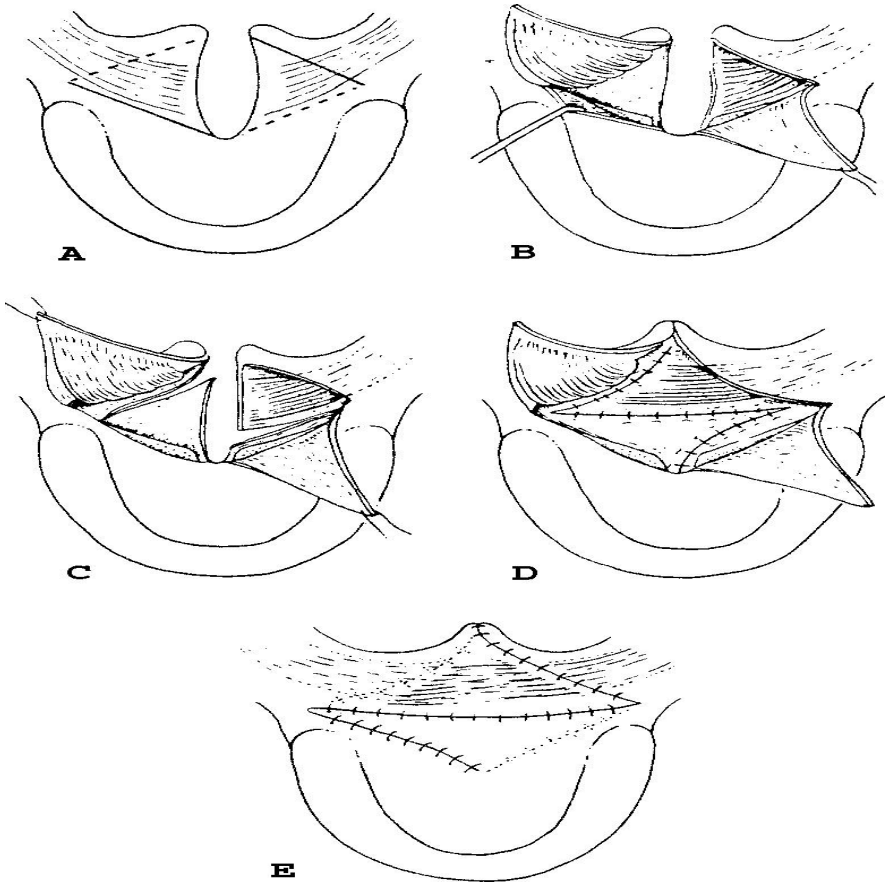
This has the advantage of providing increased length for the palate and keeps the levetor muscle in a more favorable position.



Wardill – Kilner

2. Furlow's - Double opposing Z plasty

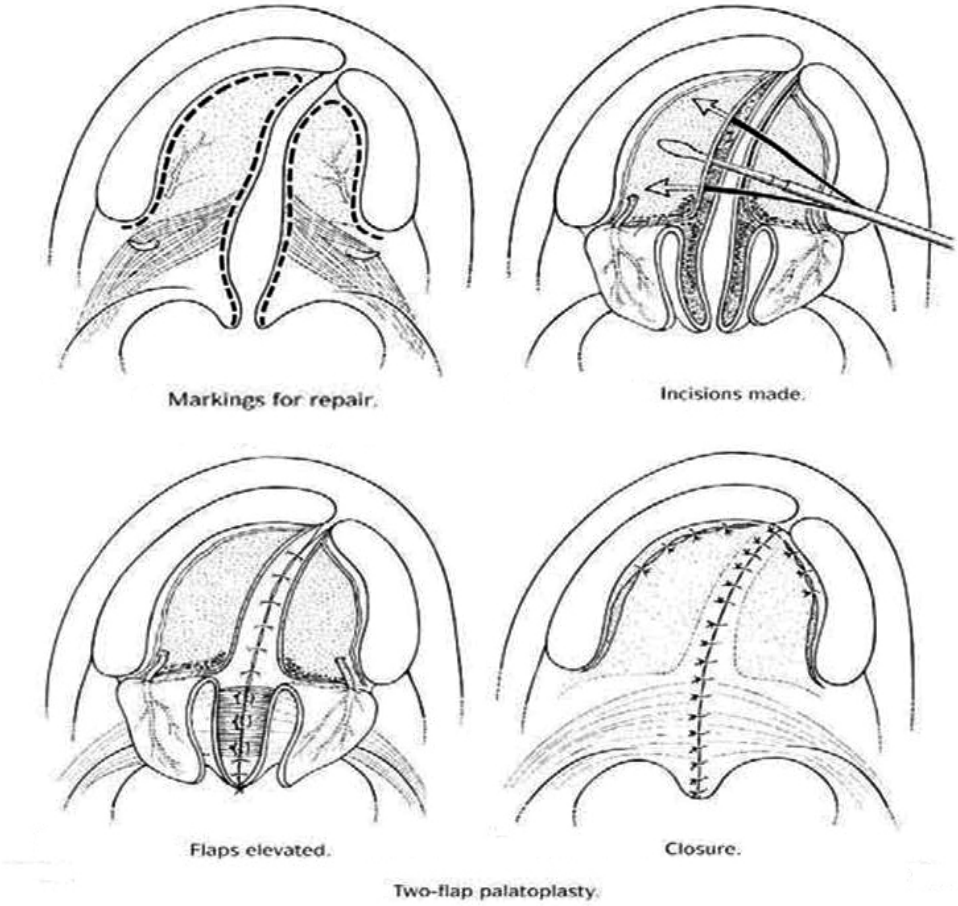
By alternating reversing Z plasties of the nasal and the oral flaps and keeping the levator palatini within the most posterior flap. Oral and nasal surfaces of the soft palate in opposite direction. For both of the Z plasties the central limb is the cleft margin and the posteriorly based flap is designed to include the levator muscle.



Furlow's - Double opposing Z plasty

3. Two flap palatoplasty :

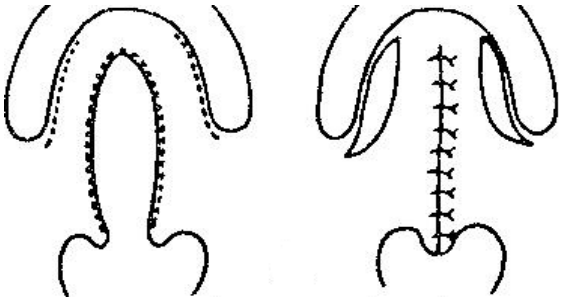
Two flap palatoplasty is freeing mucoperiosteal flaps from the cleft margins only. The more extensive two flap palatoplasty is a modification of Langenbeck technique, extending the relaxing jncisions along the alveolar margins to the edge of the cleft.



Two-flap palatoplasty.

4. Von Langenbeck operation

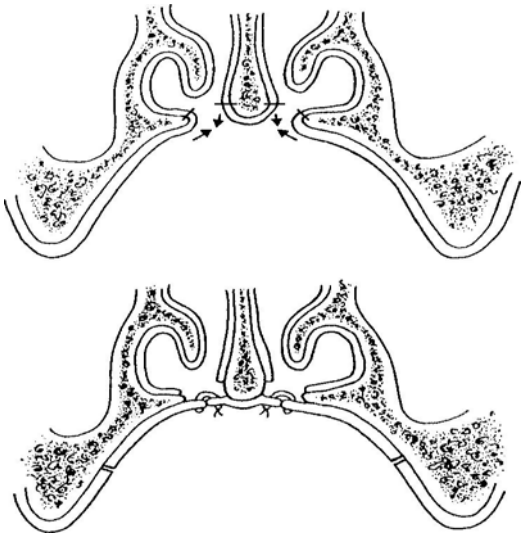
Von Langenbeck operation is simple approximation of the cleft margins with a relaxing incision that begins posterior to the maxillary tuberosity and follows the posterior portion of the alveolar ridge.



Von Langenbeck Method

5. Vomer flap

Vomer flap is taken by reflecting the mucosa from the septum near the cleft margin dissecting only enough to close the nasal mucosa of the opposite side. In bilateral cleft this requires a midline incision along the septum and two flaps are reflected in each direction.



Vomer flap

6. Primary palatoplasty with addition of pharyngeal flap

7. Primary palatoplasty with intravelar veloplasty

Intravelar veloplasty is by re-approximating the levator palatini in the midline.

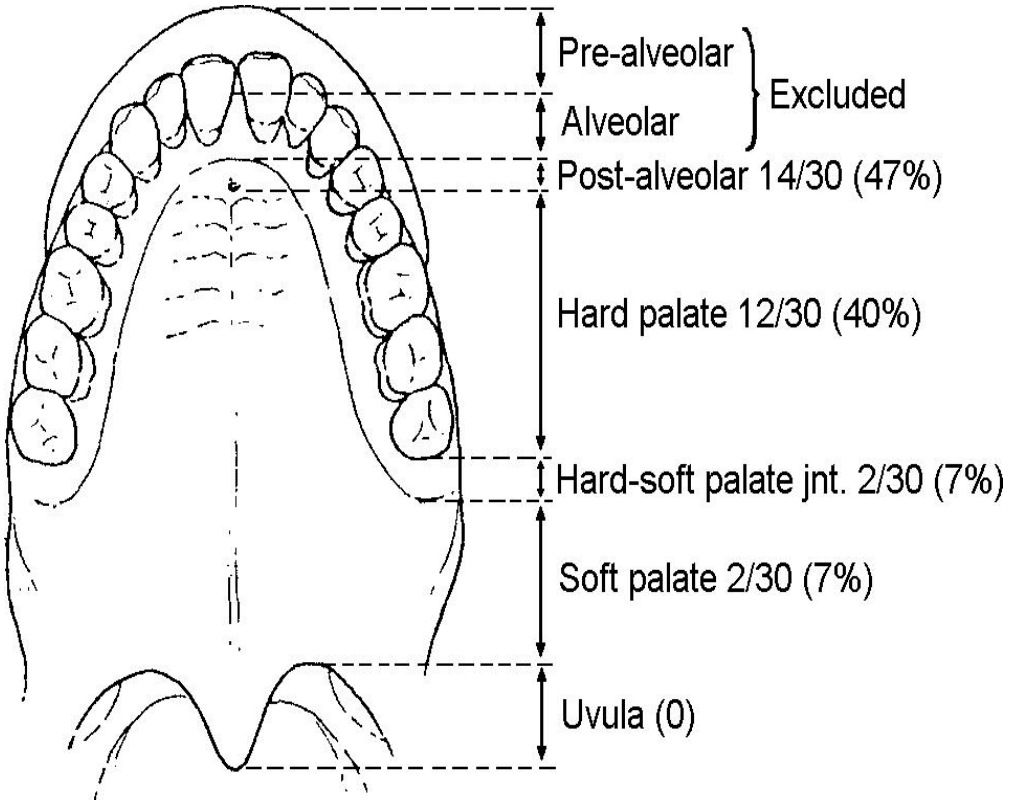
COMPLICATIONS AND MANAGEMENT

Immediate

1. Impaired airway-Post operative laryngotracheal oedema should be treated by steam inhalation, systemic steroids, traction suture in the tip of the tongue. Rarely tracheostomy may be needed.
2. Haemorrhage and blood loss- bleeding is rarely brisk and is easily controlled by electrocoagulation. Blood replacement is rarely necessary.
3. Wound disruption or dehiscence-Suture of the mucoperiosteal flaps and velum under tension causes wound disruption. Sedation will help control of crying. Fracture of hamulus reduces tension.
4. Infection should be controlled with appropriate antibiotics.

Early

1. Fistula



Tension and wound disruption will cause fistula. An added cause of fistula is residual epithelium resulting from failure to excise completely or to incise the cleft margins prior to palatoplasty. Fistula may close spontaneously if small. If the fistula is less than 5 mm in diameter it rarely account for either nasal escape of food or nasal speech. Usually only posterior fistulae are detrimental to speech.

2. Nasal speech

Rhinolalia aperta or speech typical of cleft palate may result, if palatoplasty is done late or if the palate even though closed surgically has a short anteroposterior dimension, due to mesodermal deficiency of the velum or from improper surgical technique.

3. Middle ear infection

It should be treated and speech therapy should be given after evaluating the hearing loss.

Late

1.Velopharyngeal incompetence

2. Fistula in the palate

Palatal Fistula

3. Midfacial growth abnormality

Decreased maxillary width and the resulting cross bite are managed by orthodontic maxillary expansion with a fixed appliance. Once expansion is completed the optimum time for bone grafting is chosen according to the stage of canine development. Maxillary retrusion or midface hypoplasia is managed in childhood with a palatofacial device to aid horizontal growth. Leforte-I advancement osteotomy is delayed until adolescence to avoid malocclusion related to mandibular growth.

4. Recurrent middle ear infections

Recurrent middle ear infections may need myringotomy with placement of ventilating tubes.

5. Dentitional problems like malocclusion

Orthodontic treatment is needed to correct dental arch irregularities, its maintenance and correction of occlusion.

SECONDARY SURGICAL PROCEDURES

1. With a failed palatoplasty with Rhinolalia aperta persisting for atleast 6 months the patient usually needs a v-y retroposition or a pharyngeal flap operation.

2. **For fistula :** A soft palate fistula can frequently be excised and the defect closed in two layers by hinge flap and tongue flap or by retromolar buccal flap.

Tongue Flap

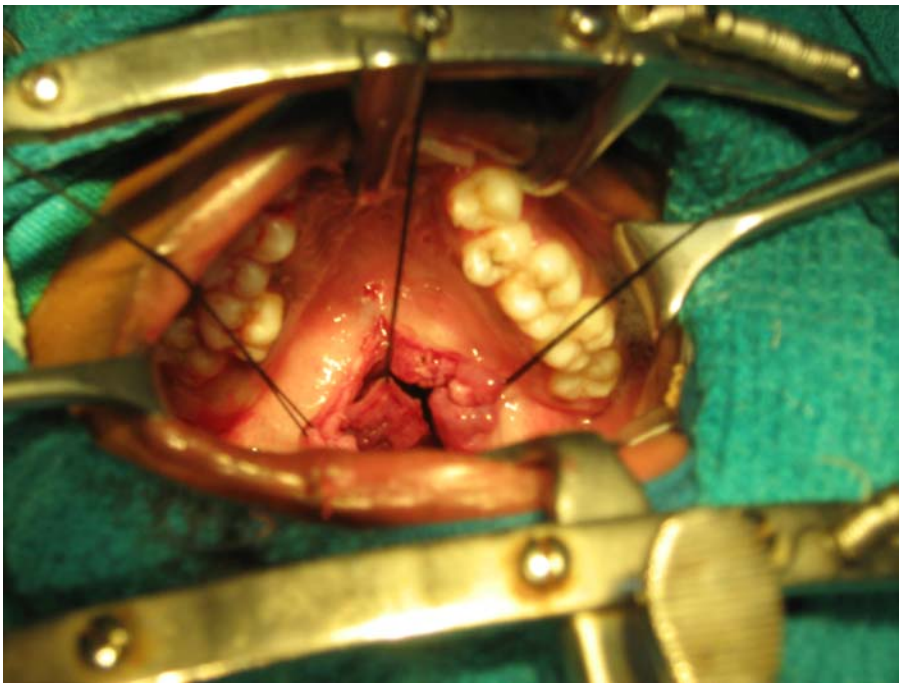
For fistula in the alveolus and adjoining hard palate a simple two layer closure normally leaves a dead space between the nasal and oral closure. A buccal flap combined with secondary bone grafting can be used with autogenous bone taken from iliac crest, caranium or rib. For fistula in the hard palate Hinge flap and transposition of local palatal mucosa and for large defects more than 1 cm diameter tongue flap can be used for oral layer.

Tongue Flap after Division

3. **Velopharyngeal incompetence** should be corrected by

(i) Posterior pharyngeal flaps

The technique of pharyngeal flap surgery involves longitudinal incisions through the mucosa and muscle down to the prevertebral fascia on each side of the posterior pharyngeal wall. Dissection is continued along the prevertebral fascia.



Posterior pharyngeal flap

Posterior pharyngeal flap

A superiorly based flap is transversely incised inferiorly and raised to the level of the palatal plane which usually corresponds to 1-2cm above the tubercle of the atlas.The flap is usually inset on the nasal side of uvula with or without opening the midline palate repair.

(ii) Reconstruction of velopharyngeal sphincter by

a. Jackson's modification of the orticochea procedure

In this the sphincter is contructed from the posterior tonsillar pillars and the palatopharyngeus muscle is included in the flaps. The flaps are sutured together with a small superiorly based posterior flap.

b. Hynes sphincter pharyngoplasty

(iii) Augmentation of posterior pharyngeal wall can be done by autogenous materials like cartilage or by alloplastic materials like silicone, Teflon and proplast.

4. Midface Hypoplasia

Leforte-I advancement osteotomy is delayed until adolescence to avoid mal occlusion related to mandibular growth for midface hypoplasia causing maxillary retrusion.

Orthodontic treatment is needed to correct dental arch irregularities it's maintenance and correction of occlusion.

5. Recurrent middle ear infections

Recurrent middle ear infections may need myring otomy with placement of ventilating tubes.

In this study, the incidence of Velopharyngeal incompetence was found to be 61% and that of palatal fistula was 28%. This proves that among the secondary complications Velopharyngeal incompetence was more common than palatal fistula.

Out of the 11 patients operated for Velo pharyngeal incompetence 5 patients were operated for cleft palate in the age between 3-6 years and 4 patients were operated for cleft palate in the age between 1-3 years and 1 patient got operated at the age of 1 year. This proves the incidence of Velopharyngeal incompetence is increased as the age of the primary repair is increased - Journal of craniofacial surgery 2009, USA, September – cutting – Sullivan SR, Marinom EM.

According to cleft palate craniofacial journal USA 1998 March, Velopharyngeal incompetence is decreased with early cleft palate repair.

Journal of craniofacial surgery USA 2009 proved increased incidents of Velopharyngeal incompetence in patients who underwent primary surgery for cleft palate in late age.

All the patients with Velopharyngeal incompetence were operated with superiorly based posterior pharyngeal flap. Among the operated cases, 10 had improvement in speech and 1 patient had persistent hypernasality.

For palatal fistula, hinge flap with local palatal mucosa flap was done for 3 cases and tongue flap was done for 2 cases who had larger and anteriorly placed fistula.

Out of the 18 patients 17 patients were operated for their cleft palate primarily with Veau Wardill Kilner push back palatoplasty and 1 patient with Furlow's repair. All 5 patients who developed fistula were primarily repaired for their cleft palate with Veau Wardill Kilner push back palatoplasty.

According to journal American society of plastic surgery, the type of cleft palate and type of repair influence the out come of secondary

complications. In complications like fistula 43% occurred after Wardill type of palatal repair, 10% in Furlow's repair and 23% in Van Langenburgh procedure.

Wide clefts after primary repair are more prone to develop fistula than persons who got operated primarily for narrow unilateral cleft.

In this study 1 patient got primarily operated for bilateral cleft palate and the secondary complication for this patient was palatal fistula. It was successfully treated with Hinge flap and tongue flap.

1 patient with malocclusion was treated with palatal expander and obtained satisfactory occlusion.

CONCLUSION

The secondary complications after cleft palate repair like fistula and Velopharyngeal incompetence can be corrected by secondary repair. Orthodontic treatment is necessary to correct dental arch irregularities and correction of occlusion.

Complications like recurrent middle ear infections may require myringotomy and ventilating tube placements and midface hypoplasia may require surgical correction with procedures like Leforte I advancement osteotomy at late teens.

Patients operated for cleft palate at late ages develop speech difficulties and middle ear infections. Early surgical intervention of cleft palate avoid the complications and gives better results. Approximating flaps without tension during primary surgery for cleft palate and control of infection reduces the risk of secondary fistula.

The addition of pharyngeal flap to primary palatoplasty or with intravelar veloplasty reduces the secondary complication like velopharyngeal incompetence

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PROFORMA

Sl No. :

Name :

Age / Sex :

IP No :

Presentation - secondary complications:

Pre – Operative diagnosis :

Type of cleft :

Previous Surgery done for cleft palate :

Age at which previous surgery done :

Procedure for secondary complications:

Operative Details :

Post Operative Details :

Follow Up :

Exclusion Criteria

Patients with identifiable syndromes, Central Nervous System disorders, Communicatively significant hearing loss, and non syntromic Robin's sequence were excluded.

MASTER CHART

S.No	Age	Sex	Pre – Operative diagnosis	Type of cleft Palate prior to primary surgery	Previous Primary surgery	Age at previous surgery done	Procedure for secondary complication	Follow Up
1.	7	M	Palatal fistula	Unilateral	Veau Wardill kilner pushback palatoplasty	2	Hinge flap & local transposition flap	No recurrence
2.	9	F	Palatal fistula	Unilateral	Push back palatoplasty	2	Hinge flap & local transposition flap	-do-
3.	12	M	Palatal fistula	Unilateral	Push back palatoplasty	3	Hinge flap & local transposition flap	-do-
4.	14	M	Palatal fistula	Unilateral	Push back palatoplasty	3	Hinge flap with tongue flap	-do-
5.	10	F	Palatal fistula	Bilateral	Vomerine flap & push back palatoplasty	2	Hinge flap with tongue flap	-do-
6.	9	M	Velopharngeal incompetence	Unilateral	Veau Wardill kilner pushback palatoplasty	1	Superiorly based posterior pharyngeal flap	Speech improvement +
7.	15	F	Velopharngeal incompetence	Unilateral	Push back palatoplasty	3	Superiorly based posterior pharyngeal flap	-do-
8.	17	M	Velopharngeal incompetence	Unilateral	Push back palatoplasty	4	Superiorly based posterior pharyngeal flap	-do-
9.	20	M	Velopharngeal incompetence	Unilateral	Push back palatoplasty	2	Superiorly based posterior pharyngeal flap	-do-

10.	14	F	Velopharngeal incompetence	Unilateral	Push back palatoplasty	4	Superiorly based posterior pharyngeal flap	-do-
11.	8	M	Velopharngeal incompetence	Unilateral	Push back palatoplasty	3	Superiorly based posterior pharyngeal flap	Speech improvement +
12.	11	F	Velopharngeal incompetence	Unilateral	Push back palatoplasty	4	Superiorly based posterior pharyngeal flap	-do-
13.	18	M	Velopharngeal incompetence	Unilateral	Push back palatoplasty	2	Superiorly based posterior pharyngeal flap	-do-
14.	7	M	Velopharngeal incompetence	Unilateral	Push back palatoplasty	1	Superiorly based posterior pharyngeal flap	-do-
15.	9	F	Velopharngeal incompetence	Unilateral	Push back palatoplasty	4	Superiorly based posterior pharyngeal flap	-do-
16.	13	F	Velopharngeal incompetence	Unilateral	Furlow's palatoplasty	5	Superiorly based posterior pharyngeal flap	Hypernasality persist
17.	8	M	Recurrent middle ear infection	Unilateral	Push back palatoplasty	3	Conservative	controlled
18.	12	F	Malocclusion	Unilateral	Push back palatoplasty	2	Palatal expander	satisfactory